Mergers and Acquisitions, Employment, Wages, and Plant Closures in the U.S. Meat Product Industries

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ABSTRACT

The purpose of this article is to evaluate the impact of mergers and acquisitions (M&As) on wages, employment, and plant closures in the meat packing, prepared meat products, and poultry slaughter and processing industries during two merger periods, 1977–1987 and 1982–1992. The analysis relies on two balanced panel datasets of all plants owned by meat and poultry firms that existed in the 1977 Census of Manufacturing and survived until 1987 and another dataset of plants that existed in 1982 and survived until 1992. We find that (a) M&As are positively associated with wages in the meat packing and prepared meat products industries during 1977–1987, but not during 1982–1992; (b) changes in employment are positively related to M&As in all three meat and poultry industries during 1977–1987, but only in the poultry industry during 1982–1992; and (c) M&As are generally negatively associated with plant closures [EconLit. Citations: J630]. © 2009 wiley Periodicals, Inc.

1. INTRODUCTION

The consolidation of the U.S. meat products industry during the past two decades has coincided with a substantial drop in real wages in large plants, a wave of mergers, and an increase in the four-firm concentration levels (MacDonald, Ollinger, Nelson, & Handy, 1999). For example, as four-firm concentration ratios in steers and heifers more than doubled to 81% during 1980–1997, wages dropped from about $10.00 to $8.50 per hour in plants with more than 500 employees (MacDonald et al.).

Do mergers and acquisitions (M&A) lead to plant closings, job losses, and wages reductions? MacDonald et al. (1999) point out that the early 1980 s was a time of substantial industry consolidation and stagnant or declining wages, and Ollinger, Nguyen, Blayney, Chambers, and Nelson (2005) show that mergers and acquisitions rose sharply during two census periods—1977–1982 and 1982–1987—and then dropped. Meanwhile, Lichtenberg and Seigel (1992a) found that M&As of manufacturing plants led to reductions in both employment and wages at central offices but had little effect at production establishments.

This article reports the results of research and analysis undertaken by the authors. It has undergone a more limited review than official publications. The article has been screened to insure that no confidential data are revealed. The judgments and conclusions herein are those of the authors and do not necessarily reflect those of the U.S. Bureau of the Census or U.S. Department of Agriculture. The authors are responsible for any remaining errors.

Agribusiness, Vol. 25 (1) 70–89 (2009)
Published online in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/agr.20186

Other research sheds more light on the relationship among wages, employment, and M&As. McGuckin and Nguyen (1998) found that acquiring food industry firms raised wages of employees of acquired plants by 12% and employment by 16% during 1977–1982. Earlier, Brown and Medoff (1988) showed that, except for divestitures, M&As had little effect on employment and wages in a sample of mostly small firms in the state of Michigan. More recently, McGuckin and Nguyen (2001) found that M&As positively affected labor productivity, wages, and employment growth at acquired plants and that plants changing owners were more likely to survive than those that did not change owners.

These studies provide valuable insights into the impact of M&As on the labor market. However, they used data for the entire U.S. manufacturing sector (Lichtenberg & Siegel, 1992b), a single state (Brown & Medoff, 1988), or a broadly defined industry (McGuckin & Nguyen, 2001). Thus, these results may not hold for specific, narrowly defined industries.

The purpose of this article is to evaluate the impact of M&As on wages and employment of acquired plants owned by meat packing plants (SIC 2011), prepared meat products plants (SIC 2013), and poultry slaughtering and processing (SIC 2015) during the 1977–1987 and 1982–1992 periods. We choose these two periods because they coincide with two recent merger waves—1977–1982 and 1982–1987. Our methodology proceeded as follows. First, we identified plants that were acquired during 1977–1982 (these were first reported in the 1982 Census) and evaluated their performance in 1987 (the next Census) relative to their peers that survived during 1977–1987. Similarly, we determined which plants were acquired during 1982–1987 and evaluated their performance relative to their competitors that survived during 1982–1992. Thus, the first merger wave was examined during 1977–1987 and a second merger wave during 1982–1992.

The analysis relies on a balanced panel dataset of all plants owned by meat and poultry firms that existed during 1977–1987 or 1982–1992 and uses a two-stage least squares model in log form to regress wage and employment growth on an instrumental variable for ownership change, a dummy variable for plants owned by acquiring firms, beginning of the period plant employment and worker wages (wage growth only), and several dummy and control variables. The control group consists of nonacquired plants owned by nonacquiring firms. We use an instrumental variable for acquisitions to control for sample selection bias because buying firms may acquire only plants with high growth potential (Nguyen & Ollinger, 2006). Additionally, because acquiring plants may also reduce employment and wages by closing plants, we used a probit model to estimate the effect of plant acquisitions on plant closures.

Our empirical model is similar to that by McGuckin and Nguyen (2001) but differs in two important ways. First, McGuckin and Nguyen's (2001) study was based on data for the food and kindred products industry (SIC 20), a broadly defined industry yielding results that may not apply to the specific meat and poultry industries. Second, McGuckin and Nguyen's (2001) study covered M&As occurring only during 1977–1982, while our work considers two major merger periods: 1977–1982 and 1982–1987 and evaluates the performance of acquired plants during 10-year periods ending in 1987 and 1992.

Results indicate that M&As positively affected changes in wages in the meat packing and prepared meat products industries during 1977–1987 but not during 1982–1992 and positively affected changes in employment in all three meat and poultry industries during the 1977–1987 period but only poultry for 1982–1992. In no case does M&A adversely affect changes in either employment or wages. Initial wage costs and plant

size do have negative effects on wage changes and employment, however, suggesting that high wage plants had slower wage growth than smaller plants. Our results also show that M&A negatively affects the likelihood of plant closure and that high wages relative to variable costs encouraged plant shutdowns during 1977–1987.

2. EMPIRICAL MODELS

The effects of mergers on workers are not obvious. M&As such as hostile takeovers are infamous because of publicity associated with the wholesale changes that sometimes accompany them: managements dismissed, plants closed, pension benefits abrogated, and wages reduced. But, M&As need not be associated with downsizing and plant closure. New ownership can bring new capital, marketing outlets, and expertise to a firm, leading to growing sales, job creation, and rising wages. Ownership change can also lead to changes in the distributions of both high- and low-skilled jobs, the mixture of rents going to labor and owners, and the amount of economic rents accruing to firms. In the face of these differences, we turn to empirical analysis.

2.1. The Wage and Employment Equations

The model specification relies on the literature on the impact of training on worker earnings and compensation and the early empirical work of Brown and Medoff (1988) and Lichtenberg and Siegel (1992a). More recent research (McGuckin, Nguyen, & Reznek, 1997; McGuckin & Nguyen, 2001), which extends the earlier work by Brown and Medoff (1988) and others, provides a more specific basis. Following McGuckin and Nguyen (2001), the model relates M&As and other variables to changes in plant employment (EMP) and wages (WAGE). The plant employment equations are written as follows:

$$\begin{aligned} InEMP_t - InEMP_{t-1} = {} & a_0 + a_1 Pr(AC) + a_2 BUYER\_PLANT \\ & + a_3 LnWAGE_{t-1} + a_4 LnEMP_{t-1} \\ & + a_5 Ln(\Delta(NPW/PW)) + a_6 Ln(\Delta(K/S)) \\ & + a_7 Ln(\Delta(SP\_RATIO)) + a_8 AGE72 + a_9 AGE77 \\ & + a_{10} MULTI + a_{11} OT\_MEAT + a_{12} NOT\_FOOD \\ & + a_{13} MULTI * LnEMP_{t-1} \\ & + a_{14} OT\_MEAT * LnEMP_{t-1} \\ & + a_{15} NOT\_FOOD * LnEMP_{t-1} + e_1 \end{aligned} \quad (1)$$

and similarly for wages:

$$\begin{aligned} LnWAGE_t - InWAGE_{t-1} = {} & a_0 + a_1 Pr(AC) + a_2 BUYER\_PLANT \\ & + a_3 LnWAGE_{t-1} + a_4 LnEMP_{t-1} \\ & + a_5 Ln(\Delta(NPWW/PWW)) + a_6 Ln(\Delta(K/S)) \\ & + a_7 Ln(\Delta(SP\_RATIO)) + a_8 AGE72 + a_9 AGE77 \\ & + a_{10} MULTI + a_{11} OT\_MEAT + a_{12} NOT\_FOOD \\ & + a_{13} MULTI * LnEMP_{t-1} \\ & + a_{14} OT\_MEAT * LnEMP_{t-1} \\ & + a_{15} NOT\_FOOD * LnEMP_{t-1} + e_2 \end{aligned} \quad (2)$$

where Ln is natural logarithm, EMP_t and $WAGE_t$ are employment and wages at the end of the two study periods (1987 and 1992) and EMP_{t-1} and $WAGE_{t-1}$ are employment and wages at the beginning of the study periods (1977 and 1982). The variable $Pr(AC)$ is an instrumental variable representing the probability of the plant being acquired and is estimated using Equation 3 below. $BUYER\_PLANT$ equals one if the plant is initially owned by the acquiring firm in 1977 or 1982 and operated by the acquiring firm through 1987 or 1992 and it equals zero otherwise. The omitted category is the plants of nonacquiring firms. There are several other control variables. $\Delta(NPW/PW)$ is the change in the ratio of nonproduction workers to production workers in the employment equation; its counterpart in the wage equation $\Delta(NPWW/PWW)$ is the change in the ratio of nonproduction worker wages ($NPWW$) to production worker wages (PWW). $\Delta(K/S)$ is the change in the capital to sales (output) ratio. ΔSP_RATIO equals the change in the product specialization ratio, i.e., the share of a plant's output coming from 5-digit Census SIC code products such as cattle slaughter or poultry slaughter products. $AGE72$ equals one for plants that existed before 1973, $AGE77$ is one for plants were open from 1973 to 1977, $MULTI$ equals one for plants owned by a multiunit firm; all three variables are zero otherwise. OT_MEAT equals one if the plant is a nonmeat plant and zero otherwise, NOT_FOOD equals one if the plant is a nonfood plant and zero otherwise, and e is the error term. The model also has interaction terms, such as $LnPROD*LnEMP_{t-1}$, because earlier work indicated that large firms (or plants) behave differently from small ones (McGuckin & Nguyen, 1995, 2001; Nguyen & Ollinger, 2006).

The above wage and employment equations are similar to those used in McGuckin, Nguyen, and Reznek (1997) who examined the impact of M&As on worker wages and relied on specifications used by Block (1979) and Ashenfelter and Kruger (1994) on worker training. The worker training variable accounts for differences in worker skill levels and is defined as the first difference of the ratio of the change of the ratio of the number of nonproduction workers (or their wages) to production workers (or their wages) ($\Delta(NPW/PW)$ and $\Delta(NPWW/PWW)$).

The model also follows Hamermesh (1980), Brown and Medoff (1989) and Dunne and Roberts (1990) who found that employer's size (EMP), age (AGE), and capital intensity ($\Delta(K/S)$) had significant impacts on wages. Dunne and Roberts (1990) also found that the capital labor ratio, two-digit SIC code industry, and geographic region affect wages.

The key variable in Equations 1 and 2 is $Pr(AC)$. Its coefficient could be negative or positive, depending on the motive of merger. If the motive of merger is managerial discipline (see Matsusaka, 1993) or efficiency (see Lichtenberg and Seigel, 1992a), one would expect this coefficient to be negative because the new owner would reorganize the firm by terminating workers, reducing wages or closing inefficient plants. In contrast, if the merger's motive is for synergy (see McGuckin and Nguyen, 1995) the new owner would retain workers and may increase wages, resulting in a positive coefficient for $Pr(AC)$.

The models also control for initial worker wages ($WAGE_{t-1}$), unique plant characteristics, and change in plant specialization (ΔSP_RATIO). Economic theory suggests that high initial wages should discourage hiring more workers and wage growth. We control for changes in the specialization ratio (ΔSP_RATIO) because

MacDonald et al. (1999) and Ollinger, MacDonald, and Madison (2000) found that plants shifted dramatically toward a greater specialized output mix during 1967–1992. The remaining variables control for firm and industry effects.

2.2. Endogenous M&A

Recent studies (Baldwin, 1991; Lichtenberg & Seigel, 1992a; McGuckin & Nguyen, 1995; Nguyen & Ollinger, 2006) suggest that M&A and plant productivity growth were positively correlated throughout the 1980 s merger wave. This positive relationship implies the existence of sample selection bias in which highly productive plants are more likely to be acquired. Accordingly, we specify a selection equation that predicts ownership changes (Equation 3). This ownership change variable serves as an instrumental variable in the employment and wage regressions.

Predicted ownership change equals the fitted value of AC (ACHAT) and is obtained from the relationship $Pr(AC) = q(\text{-ACHAT})$ in which q is the cumulative density function for the standard normal variable. The independent variables that determine ownership change are the same as the ones used in Nguyen and Ollinger (2006) and closely track those used in McGuckin and Nguyen (1995) and Lichtenberg and Seigel (1992a). Those studies found that the probability of a firm being acquired is a function of its premerger productivity and other characteristics.

$$\begin{aligned} AC_{t,t+1} = {} & b_0 + b_1 LnPROD_t + a_2 LnEMP_t + a_3 LnSP\_RATIO_t + a_4 OT\_MEAT \\ & + a_5 NOT\_FOOD + a_6 LnPROD_t * LnEMP_t \\ & + a_7 LnPROD_t * LnSP\_RATIO_t + a_8 LnPROD * OT\_MEAT_t \\ & + a_8 LnPROD_t * NOT\_FOOD_t + u_i, \end{aligned} \tag{3}$$

where $AC_{t,t+1}$ equals one if the plant was acquired during the period t, $t+1$ and zero otherwise. $PROD_t$ is a measure of a plant's premerger performance (productivity) and is defined as the plant's labor productivity (total value of shipments divided by number of employees) divided by industry average labor productivity. In Equation 3, PROD is the key determinant of AC and the sign of its coefficient depends on the motive for the merger. If the merger's motive is managerial discipline or efficiency, the coefficient of PROD should be negative because inefficient (less productive) plants should be taken over. Alternatively, if the motive for the merger is synergy, then buying firms would acquire productive plants, leaving a positive coefficient for PROD.

EMP_t, a measure of plant size, SP_RATIO, and the two dummy variables—NOT_FOOD and OT_MEAT—have been defined previously. These control variables were found significant in previous studies (e.g., see Nguyen and Ollinger, 2006).

2.3. Plant Closing Equation Equation

The above analysis is based on surviving plants, yet an acquiring firm could buy another plant and close it, thereby decreasing employment and wages. Accordingly, we follow a standard plant closure model (Equation 4). See Caves (1998) for recent comprehensive survey of research on plant (or firm) entry,

exit, and survival.

$$\begin{aligned} PC_t = {} & a_0 + a_1 Pr(AC) + a_2 BUYER\_PLANT + a_3 LnPROD_{t-1} + a_4 LnEMP_{t-1} \\ & + a_5 LnWAGE\_SHARE + a_6 AGE72 + a_7 AGE77 + a_8 MULTI \\ & + a_9 OT\_MEAT + a_{10} NOT\_FOOD + a_{11} Pr(AC) * LnEMP_{t-1} \\ & + a_{12} BUYER\_PLANT * LnEMP_{t-1} + a_{13} LnPROD_{t-1} * LnEMP_{t-1} \\ & + a_{14} LnWAGE\_SHARE_{t-1} * LnEMP_{t-1} + a_{15} AGE72 * LnEMP_{t-1} \\ & + a_{16} AGE77 * LnEMP_{t-1} + a_{17} MULTI * LnEMP_{t-1} \\ & + a_{18} OT\_MEAT * LnEMP_{t-1} + a_{19} FOOD * LnEMP_{t-1} + e_t \end{aligned} \quad (4)$$

where PC_t equals 1 if the plant was closed by year t and zero otherwise. The independent variables are based on previous research and most have been defined before. We use the probability of the plant being acquired, $Pr(AC)$ due to potential sample selection bias.

The probability of the plant being acquired is our variable of interest. If the motive for the merger is for synergistic purposes, then acquiring firms would buy a plant only if the acquired plant would help improve the performance of the combined firm. This implies that the buying firm will keep the acquired plant after the merger. In this case, $Pr(AC)$ should be negatively related to plant closing. Alternatively, if the motive for the merger is to discipline management, the new owner would weed out unproductive plants. Then PR(AC) should be positively associated with plant closings.

Following McGuckin and Nguyen (1998), we control for plants owned by acquiring firms, *BUYER_PLANT*. The omitted ownership group is those plants owned by nonacquiring firms. Initial plant relative productivity ($LnPROD_{77}$) is defined above and comes from McGuckin and Nguyen (1998). We include plant size, $LnEMP_{t-1}$, and plant age, *AGE72* and *AGE77*, because of relationships found between these variables and plant survival by several researchers (Dunne, Roberts, & Samuelson, 1989; Baldwin, 1991). *WAGE_SHARE* is worker compensation costs as a share of total costs and is included because MacDonald et al. (1999) document large reductions in labor costs during 1972–1992. The other variables control for firm effects, i.e., multiplant versus single-plant firms, and product output. Finally, we allow for nonlinear effects of initial productivity and employment size on plant closure with interaction terms.

We use the Probit regression to estimate our model. See Green (2000) for details.

3. DATA AND VARIABLE MEASUREMENT

3.1. Data Source: The Longitudinal Research Database (LRD)

The data used in this study are taken from the Census Bureau's longitudinal research database (LRD), which contains information on output, employment, and costs for individual U.S. manufacturing establishments. The output data include total value of shipments and value added. Employment data comprise the number of nonproduction workers, production workers, worker wages, and hours for production workers. Cost data comprise information on capital, labor, energy, materials, and selected purchased services.

An important feature of the LRD is its plant classification and identification information: firm affiliation, location, product and industry, and various status codes which identify, among other things, birth, death, and ownership changes. These identifying codes are used in developing both the longitudinal plant linkages and the ownership linkages among plants. For a more complete description of the LRD, see McGuckin and Pascoe (1988). For a detailed discussion of the identification of ownership changes (through M&As), see Nguyen, 1998.

3.2. Sample Coverage and Variable Measurement

We examine three 4-digit meat and poultry industries: meat packing (SIC 2011), prepared meat products (SIC 2013), and poultry slaughter and processing (SIC 2015) during 1977–1987 and 1982–1992. The sample of plants for 1977–1987 is all plants owned by meat and poultry firms that existed in 1977 and survived until 1987, and the sample of plants for 1982–1992 is all plants owned by meat and poultry firms that existed in 1982 that survived until 1992. Wage and employment changes are evaluated for each group during 10-year periods: 1977–1987 and 1982–1992. We use a 10-year period because this time period allows changes to occur for 5 to 9 years after acquisitions, providing sufficient time for the acquiring firm to integrate acquired plants into their operations, or to dispose of them.

There are two important reasons for focusing on the 1977–1992 period. First, this period includes four censuses of manufactures so that we are confident of correctly identifying all acquired plants. Because data are available from only a sample of plants in noncensus years, we use data from census years only (1977, 1982, 1987, and 1992). Second, the period covers the beginning and ending years of recent merger movements in the meat and poultry industries.

The main variables examined in this study are employment and wages. Employment equals the total number of employees and consists of production and nonproduction workers. Wages are defined as workers' annual salaries. This measure of wages does not include nonwage costs because separate data on these costs are not available for the two types of workers, and Dunne and Roberts (1993) report that nonwage costs are poorly reported in Census data. Because Census wage data are nominal wages, we deflated them by the consumer price index taken from the *Survey of Current Business* (September, 1993). Other variables are discussed below in the context of the presentation of the empirical models.

3.3. M&As in the Meat Products Industry

Using the LRD, we identified every meat and poultry plant that was acquired during 1977–1982 and 1982–1987 and the firm that bought or sold it. Next, using these firms, a dataset was created that contained all of the manufacturing plants owned by acquiring and acquired firms at the beginning of the period (1977 or 1982), whether or not they were located in the meat products industry. The sample for 1977–1982 for the meat packing, prepared meat products, and poultry slaughter and processing industries included 251, 178, and 312 plants, respectively. The corresponding numbers of all plants owned by acquiring firms in 1977 are 684, 412, and 518, respectively. These plants may or may not have been in the meat or poultry industry. We also identified the firms owning the plants in meat and poultry that were not acquired during 1977–1982. These nonacquiring firms in the three industries owned

2,042, 1,214, and 442 plants in 1977, respectively. Thus the 1977–1982 data consist of 6,053 plants.

The sample of plants for 1982–1987 included 226, 353, and 316 plants for the meat packing, prepared meat products, and poultry slaughter and processing industries, respectively. The acquiring firms owned 315, 580, and 560 plants; the numbers of plants owned by nonacquiring firms amounted to 1,326 by meat packing, 1,155 by prepared meat products, and 359 poultry slaughter and processing plants. In total, the 1982–1987sample consists of 5,190 plants.

4. EMPIRICAL RESULTS

4.1. The Effect of M&As on Plant Employment Changes

Columns 1–3 of Table 1 show the regression estimates of the employment growth equations for the meat packing, prepared meat products, and poultry and processing slaughter industries, respectively, for 1977–1987; columns 4–6 present the estimates for the same industries for 1982–1992. All the equations are estimated using the two-stage procedure discussed above. The results for the probit Equation 3, which are used to construct the variable $Pr(AC)$, are reported in Table A1. We do not discuss the results of the probit equation here because the underlying model is not a central focus of this article and is discussed elsewhere (Nguyen & Ollinger, 2006).

Table 1 shows that the coefficients for the ownership change variable, $Pr(AC)$, are positive and statistically significant at the one percent level for all three industries for 1977–1987, indicating a positive relationship between M&As and changes in employment. To illustrate, a coefficient for $Pr(AC)$ having value of 1.22 (column 1) implies that an increase in $Pr(AC)$ by 1.00% leads to an increase in employment growth of 1.22%. The relationship between acquisitions and employment changes differs during 1982–1992. Only the coefficient for $Pr(AC)$ for poultry (column 6) is significant and positive; the coefficients for the two meat industries are negative and insignificant. Although the 1977–1987 results are consistent with McGuckin and Nguyen's finding (2001) for the entire food industry, it cannot be claimed that acquisitions always lead to positive employment growth. One can say, however, that M&As did not cause massive job dislocations, and may have led to some employment growth in some industries.

One explanation for the mixed results is that consolidation in the earlier period (1972–1982) enabled some firms to combine output in some plants to enhance productivity in those facilities while closing others. Because acquired plants are likely to be better assets than the plants the firm held prior to the merger (McGuckin & Nguyen, 1995; Nguyen & Ollinger, 2006), output and employment would have grown in these plants and shrank elsewhere. In the later period (1982–1992) this structural shift had pretty much played itself out, providing fewer opportunities to shift output from less productive existing plants to newly acquired more efficient ones. Thus, acquired plants tended to add employees in the first period but not the second one.

The coefficient on initial plant size ($\ln EMP_{t-1}$) shows the impact of initial plant size of plants owned by single-plant firms on employment change. The coefficients are significantly negative in the two meat industries and positive, but insignificant, in poultry slaughter and processing during both periods.

TABLE 1. The Results for the Employment Equation

	Meat packing	Prepared meat products	Poultry slaughter and processing	Meat packing	Prepared meat products	Poultry slaughter and processing
Variable		1977–1987			1982–1992	
Intercept	0.700***	0.277	0.529	−0.228	−0.067	0.732**
	(0.232)	(0.240)	(0.326)	(0.189)	(0.158)	(0.333)
$LnWAGE_{t-1}$	0.072	0.268***	−0.132***	0.168**	0.186***	−0.124
	(0.085)	(0.092)	(0.130)	(0.071)	(0.053)	(0.091)
$LnEMP_{t-1}$	−0.325***	−0.488***	0.138	−0.236***	−0.266***	0.073
	(0.087)	(0.097)	(0.132)	(0.080)	(0.066)	(0.094)
Ln(ΔNPW/PW)	0.065	0.075**	−0.023	0.096**	0.025	0.052
	(0.042)	(0.033)	(0.017)	(0.050)	(0.030)	(0.034)
Ln(ΔK/S)	−0.009***	0.017	−0.009***	−0.0003	−0.0004	−0.0001
	(0.002)	(0.011)	(0.002)	(0.0007)	(0.0005)	(0.0004)
Ln(ΔSP_RATIO)	−0.007	0.018**	−0.125**	0.025	0.017	0.133*
	(0.013)	(0.008)	(0.065)	(0.056)	(0.051)	(0.075)
Pr(AC)	1.232***	1.200***	0.568**	−0.062	−0.226	1.217**
	(0.211)	(0.435)	(0.273)	(0.368)	(0.374)	(0.565)
BUYER_PLANT	0.102	−0.107	0.021	0.015	−0.180***	−0.079
	(0.082)	(0.099)	(0.064)	(0.073)	(0.056)	(0.058)
AGE72	−0.094	−0.211***	−0.257***	−0.195**	−0.225***	−0.272***
	(0.061)	(0.068)	(0.081)	(0.070)	(0.059)	(0.087)
AGE77	–	–	–	−0.055	−0.062	−0.059
				(0.084)	(0.069)	(0.095)
MULTI	0.126	0.682**	−0.741	0.332	0.304	−0.611
	(0.336)	(0.298)	(0.520)	(0.372)	(0.251)	(0.498)
OT_MEAT	−1.017***	−0.744***	0.115	0.153	0.035	0.268
	(0.221)	(0.283)	(0.244)	(0.212)	(0.165)	(0.220)
NOT_FOOD	−1.468***	−1.123	0.572	0.247	0.268	−0.171
	(0.329)	(0.716)	(0.458)	(0.444)	(0.345)	(0.517)
MULT*	0.021	−0.137**	0.143	0.008	0.005	0.129
$LnEMP_{t-1}$	(0.062)	(0.063)	(0.092)	(0.067)	(0.046)	(0.082)
OT_MEAT*	0.221***	0.150***	−0.083*	−0.005	0.038	−0.160***
$LnEMP_{t-1}$	(0.047)	(0.051)	(0.051)	(0.045)	(0.034)	(0.047)
NOT_FOOD*	0.275***	0.182	−0.194**	−0.017	0.003	−0.028
$LnEMP_{t-1}$	(0.593)	(0.133)	(0.093)	(0.075)	(0.062)	(0.096)
R^2	0.156	0.149	0.113	0.040	0.059	0.125
OBS	916	654	553	850	1033	605

Note: Standard errors are in parentheses. Dependent variable is Ln (Emp_t) - Ln(Emp_{t-1}). *, **, *** denote significance at 10%, 5%, and 1% significance levels, respectively.

One should interpret the effect of initial employment on changes in employment at other firm-types with care because there are interaction terms between $lnEMP_{t-1}$ and three other variables. The effect of initial employment on employment changes is $d[dlnEMP_t]/d[lnEMP_{t-1}] = a_4 + a_{13} * MULTI + a_{14} * OT\_MEAT + a_{15} * NOT\_FOOD$. Thus, for example, in the prepared meat products industry (column 3), the effect of initial employment in a plant owned by a multiunit firm equals

–0.725($= a_4 + a_{13} * \text{MULTI} = -0.488 - 0.137 = -0.725$). For a plant owned by a single-unit firm, this effect equals –0.488 $= -0.488 + -0.137 * (\text{MULTI} = 0)$. These estimates show that high initial employment has a negative effect on employment growth and that the effect is more negative in plants owned by multiunit firm than in single-unit firms. More specifically, an increase in initial employment in a multiunit firm's plant leads to a decline by 0.725% in its employment growth whereas an increase in initial employment in a single-unit firm leads to a decline 0.488% in its employment growth. For the poultry industry, initial employment does not register any significant effect on employment growth.

The coefficients for the interactions of initial employment with OT_MEAT and NOT_FOOD in the meat packing and prepared meat products industries (columns 1 and 2) indicate that compared to meat and food plants, high initial employment tends to increase employment growth in nonfood and other meat plants for the 1977–1987 period. This effect, however, is not significant for the 1982–1992. For the poultry industry, the result shows that initial employment is negatively related to employment growth compared to the other two industries for both periods (see columns 3 and 6).

The remaining coefficients of the employment equation illustrate the extent to which other plant characteristics contribute to employment growth. The signs on initial wages ($\ln WAGE_{77}$) are positive in the meat industries and negative for poultry, suggesting that meat plants that paid higher initial wages tended to hire workers at a faster rate than plants that paid lower initial wages; the reverse was true for poultry plants. For example, 10% increases in initial wages led to a 0.7% increase in employment growth in meat packing but a 1.32% drop in employment growth in poultry during 1977–1987.

Other coefficients are interpreted as follows. The coefficient on the ratio of nonproduction workers to production workers suggests that a greater share of higher skilled workers leads to positive employment growth in five of six industries (only two are significant). The negative coefficients for the age variables are consistent with previous research (Brown & Medoff, 1989; Dunne & Roberts, 1990) that found that successful (surviving) young plants grow faster than older plants. The negative impact of greater capital intensity $\text{Ln}(\Delta K/S)$ on employment growth is consistent with Dunne and Roberts (1990). Finally, changes in plant specialization have mixed effects on employment growth.

4.2. The Effect of M&As on Plant Wages

Table 2 presents the estimates of the wage equation. Columns 1–3 contain the results for 1977–1987; columns 4–6 have the estimates for 1982–1992. All the coefficients for $Pr(AC)$ are positive but only two are significant, implying that wages increased somewhat more quickly for plants undergoing M&A than plants that did not experience ownership changes. This outcome leaves two possibilities. It could be that wages at acquired plants didn't change while worker compensation at existing plants dropped because worker bargaining power diminished due to falling demand for meat products, competition from nonunion plants, or the availability of low cost immigrant labor (MacDonald et al., 1999). Alternatively, it could be that compensation at newly acquired plants rose because of greater economies from newer plants and productivity growth from newly acquired plants. In either case, the

TABLE 2. The Results for the Wage Equation

	Meat packing	Prepared meat products	Poultry slaughter and processing	Meat packing	Prepared meat products	Poultry slaughter and processing
Variable	1977–1987			1982–1992		
Intercept	1.544***	1.206***	1.556***	0.278***	0.358***	0.402***
	(0.252)	(0.264)	(0.332)	(0.080)	(0.083)	(0.142)
$LnWAGE_{t-1}$	−0.409***	−0.199**	−0.498***	−0.064**	0.058**	−0.093**
	(0.093)	(0.102)	(0.133)	(0.030)	(0.028)	(0.039)
$LnEMP_{t-1}$	0.337***	0.162	0.558***	0.043	0.039	0.073*
	(0.095)	(0.107)	(0.134)	(0.033)	(0.034)	(0.042)
Ln(ΔNPWW/	0.081*	0.079**	0.004	0.272***	0.168***	0.125***
PWW)	(0.046)	(0.037)	(0.018)	(0.021)	(0.016)	(0.014)
Ln(ΔK/S)	−0.009***	0.019	−0.009***	0.0005*	0.0002	−0.0001
	(0.002)	(0.012)	(0.002)	(0.0003)	(0.0003)	(0.0002)
Ln(ΔSP_RATIO)	−0.010	0.021**	−0.152**	0.035	0.032	0.042
	(0.015)	(0.008)	(0.066)	(0.024)	(0.027)	(0.031)
Pr(AC)	0.835***	1.088**	0.443	0.128	0.032	0.187
	(0.230)	(0.480)	(0.278)	(0.155)	(0.196)	(0.216)
BUYER_PLANT	0.168*	−0.150	0.042	0.027	0.002	0.037
	(0.090)	(0.109)	(0.065)	(0.031)	(0.029)	(0.025)
AGE72	−0.112*	−0.215**	−0.195**	−0.042	−0.026	−0.011
	(0.066)	(0.075)	(0.083)	(0.029)	(0.031)	(0.036)
AGE77	–	–	–	0.030	0.010	0.038
				(0.035)	(0.035)	(0.041)
MULTI	0.655*	1.104***	−0.095	0.142	0.298**	−0.073
	(0.364)	(0.328)	(0.529)	(0.156)	(0.131)	(0.214)
OT_MEAT	−0.163	−0.078	0.477**	−0.00002	−0.043	−0.060
	(0.240)	(0.312)	(0.248)	(0.089)	(0.086)	(0.066)
NOT_FOOD	−0.268	−0.929	0.598	0.114	0.197	−0.349**
	(0.357)	(0.790)	(0.450)	(0.187)	(0.170)	(0.175)
MULTI*	−0.091	−0.242***	0.018	−0.023	−0.054**	0.006
$LnEMP_{t-1}$	(0.357)	(0.069)	(0.093)	(0.028)	(0.024)	(0.036)
OT_MEAT*	0.065	0.015	−0.105**	0.003	0.006	−0.002
$LnEMP_{t-1}$	(0.051)	(0.057)	(0.052)	(0.019)	(0.018)	(0.010)
NOT_FOOD*	0.082	0.153	−0.124	−0.008	−0.035	−0.061
$LnEMP_{t-1}$	(0.064)	(0.147)	(0.097)	(0.031)	(0.035)	(0.043)
R^2	0.085	0.056	0.113	0.179	0.118	0.145
OBS	916	654	553	850	1033	605

Note: Standard errors are in parentheses. Dependent variable is Ln ($Wage_t$) - Ln($Wage_{t-1}$). *, **, *** denote significance at 10%, 5%, and 1% significance levels, respectively.

result is consistent with McGuckin and Nguyen (1995) who found a significantly positive impact of acquisitions on wage growth during 1977–1987.

The estimates for other variables are consistent with previous studies. The coefficients for initial wages ($WAGE_{t-1}$) are negative and significant in five of six cases, indicating that, in most cases, high initial wages led to slower wage growth.

Notice that the absolute values of the initial wage coefficients declined substantially in the 1982–1992 period, suggesting less responsive wage growth in the second period. This finding is consistent with a finding by MacDonald et al. (1999) that wages dropped in meat plants during the early 1980 s and then stabilized at a lower level.

The coefficients for the initial plant size variable ($LnEMP_{t-1}$) are positive in all cases and significant in three of those cases, suggesting that higher initial plant size leads to an increase in wage growth in meat or poultry plants owned by single-plant firms. The interaction of initial employment with dummy variables for other meat or poultry plants, nonfood plants, and plants owned by multiplant firms ($OT\_MEAT*LnEMP_{t-1}$ and $NOT\_FOOD*LnEMP_{t-1}$) are not significant, suggesting that plant size effects for these plants is like the effect of plants owned by single-plant meat or poultry firms. The impact of size on wages declined in the second period (1982–1992) but remained positive, a finding that is consistent with MacDonald et al. (1999).

There is a substantial difference in initial employment effects in the first period for plants owned by multiplant firms relative to plants owned by single-plant firms in the prepared meat products industry. The coefficient on EMP_{t-1} is insignificant and positive, but the interaction of MULTI with EMP_{t-1} is strongly negative, indicating that higher initial employment led to a drop in wage growth in plants owned by multiplant firms but has no significant effect in plants owned by single-plant firms. Initial employment for both periods at plants owned by multiplant firms in the meat packing industry still had a positive effect on wage growth, but it too is diminished from the level of single-plant firms. Both of these results are consistent with MacDonald et al. (1999). Finally, notice that in contrast to meat plants, initial employment for plants owned by multiplant poultry firms is higher relative to their counterparts owned by single-plant poultry firms, perhaps because of the increasing returns to scale attributed to that industry by Ollinger, MacDonald, and Madison (2000).

The ratio of nonproduction workers to production workers had a positive impact on wage growth in all industries (five are significant) and is consistent with Ashenfelter and Kruger (1994). Also, all six of the coefficients for AGE72 are negative with three being significant. Combined, these results indicate that younger meat plants that were staffed by a large number of nonproduction workers who earned relatively low initial wages had greater wage growth than older plants with relatively more production workers and higher initial wages. The trend was the same for poultry plants except that it applies to plants owned by firms owning multiple plants.

Previous work by Dunne and Roberts (1990) suggested that capital intensity has a negative effect on plant wages, but our results are mixed. The coefficient for capital intensity is significantly negative in the meat packing and poultry slaughter and processing industries during 1977–1987 and significantly positive in meat packing during 1982–1992. Finally, the sum of coefficients on plants owned by multiplant firms and the interaction of this term with the number of employees suggests that small meat plants owned by multiplant firms had slower wage growth than those owned by single-unit firms. The opposite occurred in poultry.

4.3. The Effect of M&As on Plant Closings

The probit regression results for 1977–1982 are reported in Table A2, while those for 1982–1987 are shown in Table A3. In each table, columns 1, 3, and 5 show the results for the simple linear model for the meat packing, prepared meat products, and

TABLE 3. Marginal Effects (dF/dx) of Ownership Change and Plant Characteristics on Plant Closures

Dependent variables	Meat packing		Prepared meat products		Poultry slaughter and processing	
	1977–1982	1982–1987	1977–1982	1982–1987	1977–1982	1982–1987
LnPROD77	0.173**	−0.029	0.063	−0.003	0.171**	0.013
	(0.055)	(0.030)	(0.073)	(0.034)	(0.052)	(0.074)
$LnEMP_{77}$	−0.175**	0.039	−0.190**	−0.103**	−0.185**	0.005
	(0.040)	(0.042)	(0.044)	(0.032)	(0.026)	(0.055)
LnWAG_SHARE	0.175**	−0.013	0.196*	0.074	0.270**	0.011
	(0.063)	(0.044)	(0.086)	(0.052)	(0.054)	(0.074)
Pr(AC)	−0.867	0.135	−1.096**	1.629**	−1.097**	0.557
	(0.744)	(0.538)	(0.429)	(0.543)	(0.297)	(0.853)
BUYER_PLANT#	0.454**	0.071	0.218+	0.032	0.104+	−0.019
	(0.139)	(0.136)	(0.149)	(0.108)	(0.068)	(0.095)
AGE72#	−0.038+	−0.031	−0.028	−0.005	−0.023	−0.025
	(0.021)	(0.025)	(0.025)	(0.024)	(0.021)	(0.034)
AGE77#	–	−0.034	–	−0.019	–	−0.014
		(0.026)		(0.027)		(0.034)
MULTI#	0.163	0.120	0.096	0.255*	0.107	0.137
	(0.152)	(0.158)	(0.120)	(0.150)	(0.133)	(0.315)
OT_MEAT#	−0.401**	−0.050	0.398**	−0.209	0.012	−0.396**
	(0.123)	(0.152)	(0.116)	(0.142)	(0.068)	(0.174)
NOT_FOOD#	0.001	0.216	−0.390**	0.016	−0.173*	0.487*
	(0.746)	(0.340)	(0.049)	(0.133)	(0.029)	(0.233)
LnPROD77*	−0.033**	0.023***	−0.026	−0.005	−0.047**	0.013
$LnEMP_{77}$	(0.014)	(0.07)	(0.018)	(0.010)	(0.012)	(0.019)
LnWAG_SHARE*	−0.023	0.026**	−0.052**	−0.011	−0.061**	0.026
$LnEMP_{77}$	(0.015)	(0.013)	(0.021)	(0.013)	(0.013)	(0.021)
Pr(AC)*	0.063	−0.066	0.159+	−0.186*	0.119**	−0.254**
$LnEMP_{77}$	(0.109)	(0.085)	(0.087)	(0.093)	(0.013)	(0.049)
BUYER_PLANT*	−0.070*	−0.008	−0.017	0.007	−0.020	0.025
$LnEMP_{77}$	(0.033)	(0.026)	(0.027)	(0.023)	(0.013)	(0.019)
MULTI*	0.008	−0.034	0.009	−0.045+	−0.007	−0.010
$LnEMP_{77}$	(0.035)	(0.027)	(0.024)	(0.025)	(0.020)	(0.041)
OT_MEAT*	0.057	−0.023	−0.079**	0.008	0.008	0.114**
$LnEMP_{77}$	(0.036)	(0.034)	(0.027)	(0.029)	(0.017)	(0.035)
NOT_FOOD*	0.055	−0.063	0.101**	0.008	0.051**	−0.103*
$LnEMP_{77}$	(0.116)	(0.060)	(0.035)	(0.028)	(0.019)	(0.047)
Log likelihood	−1660	−1137	−867	−6798	−426	−515
OBS	3066	2090	1803	2108	1276	1169
Chi-square	623.29	152.99	239.03	159.95	221.50	136.16
Pseudo r^2	0.1784	0.0734	0.1366	0.0816	0.2251	0.1290

Note: Plants acquired during 1977–1982 and 1982–1987. Robust standard errors in parentheses. Dependent variable is plant closure (PC = 1,0). # dF/dx is for discrete change of dummy variable from 0 to 1. **, *, + denote significance at 10%, 5%, and 1% significance levels, respectively.

chicken slaughter and processing industries, respectively, and columns 2, 4, and 6 contain the estimates for the nonlinear model for the same three industries. Table 3 reports marginal effects of the independent variables on plant closings. Columns 1, 3,

and 5 contain the coefficients for the period 1977–1982, while columns 2, 4, and 6 report the coefficients for the period 1982–1987. We focus our discussion on the results reported in Table 3 because marginal effects have clearer interpretation than probit regression coefficients.

Of primary interest is the effect of plant acquisitions on plant closures ($Pr(AC)$). The estimated coefficients for the ownership change variable are negative in all three industries during 1977–1982, indicating that these plants were less likely to be closed. The interaction of plant size and acquisitions, $\text{LnEMP}_{77}*Pr(AC)$ is positive, suggesting that smaller, acquired plants were less likely to be closed than were very large ones. This finding is consistent with McGuckin and Nguyen (2001).

The results differ markedly for 1982–1987. The estimated coefficients for $Pr(AC)$ become positive in all three industries and significantly so in the prepared meat products industry (column 4). In contrast, the coefficients of the interaction term, $Pr(AC)*\text{LnEMP}_{82}$, are negative in all three industries, and significantly so in the prepared meat products and poultry slaughter and processing industries. The negative coefficients imply that small plants acquired during 1982–1987were more likely to be closed than large ones.

The above results show that the merger waves of 1977–1982 and 1982–1987 were distinctly different and match anecdotal evidence. The meat packing and prepared meats industries underwent a major transformation in the earlier period (1977–1982), as entrants and upstarts producing boxed meat products in huge plants replaced many well-established, large manufacturers that produced carcasses in large plants (MacDonald et al., 1999; Ollinger, MacDonald, & Madison, 2000). As a result, many big factories came onto the merger market and many of these were outdated. At the same time, growth in per capita beef and pork consumption dropped, making production cutbacks necessary. The result was a huge consolidation with many large plants being shut down. However, the large plants that remained in operation after 1982 were less likely to be shut down because they benefited from economies of scale and produced higher value boxed meat products.

Other results are consistent with previous studies. Similar to Dunne, Roberts, and Samuelson (1989), plant size (LnEMP) is negatively associated with plant closures in four of six cases. Plant age is negatively related to closures in all six cases, possibly because more experienced management could more readily adapt to the changing economic environment. We note, however, that most coefficients of the age variables are not statistically significant.

The results also show that a higher ratio of wages to costs (LnWage_SHARE) led to a greater likelihood of plant closure in the three industries during 1977–1982. The negative coefficients for the interaction terms (LnWAG_SHARE*LnEMP) indicate that the positive effect of the wage cost share diminishes as plant size increases, suggesting that large plants with high wage cost shares were less likely to closed.

The results for LnWage_SHARE are mixed in the second period. The coefficient for LnWage_SHARE in meat packing became negative and coefficients for the interaction of LnWage_SHARE and EMP for meat packing and poultry processing became positive, suggesting that large meat packing and poultry processing plants with a higher wage cost share were more likely to exit. Prepared meat products for the later period was similar to that for the first period.

We attribute the difference in the effect of wage cost shares at small and large plants on plant closings to the nature of plant output during 1977–1987. MacDonald et al. (1999) and Ollinger, MacDonald, and Madison (2000) show that during this period, large plants shifted from mainly carcass production to the production of

boxed meat, poultry parts, and other relatively high value products. These higher value products required greater labor inputs but remained profitable, allowing their producers to remain in business. Carcass producers, on the other hand, had relatively fewer workers but were forced to exit the business because their output was not as valuable. Signs changed to a positive effect of wage cost share on plant closures for large plants in the second period because, by this time, the transition from lower value to higher value products had slowed and plants with higher wage cost shares were those with high wage costs.

Finally, plants owned by multiplant firms appear to be positively associated with plant closure; however, most of the coefficients are not statistically significant.

5. DISCUSSION

A major finding of this article is that meat and poultry mergers led to an increase in employment at acquired plants during 1977–1987 but not during 1982–1992. Another major point is that mergers had little impact on worker wages. Both of these findings are consistent with previous research and suggest the following scenario.

MacDonald and Ollinger (2005) point out that real wages began to drop around 1980 when existing meatpackers, pressured by largely nonunion upstarts, demanded lower wages. At the same time, a drop in demand for meat products led to production cutbacks. The net effect was intense pressure both on workers to comply with demands for lower wages and on high-cost firms to exit the industry. In this environment, industry upstarts obtained some high quality, under-utilized plants that came onto the market. Recognizing that they had to increase plant output to be competitive (MacDonald & Ollinger), they added workers at existing nonunion rates. These rates matched or exceeded wages that existed before the acquisition. Further wage gains were tempered by the largely repetitive, low-skill nature of these jobs and the ready availability of labor.

The finding that small, acquired plants were less likely to be closed during 1977–1982 and large ones less likely to be closed during 1982–1987 needs further discussion. Some of the change may be due to the shift in meatpacking operations to the West and poultry operations to the Southeast (MacDonald et al., 1999; Ollinger, MacDonald, & Madison, 2000). A more important source of differences may have been the radical changes in the technologies of the three meat and poultry industries. In these industries, stagnating demand conspired with a new technology to force closure of many large plants and the exit of many old-line manufacturers (Ollinger et al., 2005), as many plants moved to larger, horizontal flow processing facilities that were better suited for highly specialized processing and the geographic shifts in cattle slaughter from the eastern part of the Corn Belt to lower cost Great Plains States where they enjoyed closer proximity to their herds (MacDonald et al., 1999).

During the same period, hog slaughter plants found it advantageous to obtain hogs under contract from large growers and moved to the Southeast. The changed industries that emerged during the later 1980 s featured much larger plants using more modern technologies and under new management (MacDonald et al., 1999). Because firms tended to buy more productive plants and then improve plant productivity (Nguyen & Ollinger, 2006), acquired plants were well-positioned for employment growth. However, acquiring firms did not increase wages beyond that which is the industry standard.

6. CONCLUDING REMARKS

In this article, we examined the effect of plant acquisitions on plant employment, wages, and plant closures during two merger waves 1977–1982 and 1982–1987. We found that M&As positively affected employment at plants acquired during 1977–1982, but not at those acquired during 1982–1987 and had a significantly positive effect on wage growth during 1977–1987 and a positive but insignificant effect during 1982–1992. We also found that M&As increased the likelihood of survival of small plants acquired during 1977–1982, and decreased the likelihood of closure of large plants acquired during 1982–1987. Overall, these results do not support the view that M&As caused worker dislocation and lost wages, but they also do not suggest that being part of a M&A always increased wages and employment. At best, workers in acquired plants had modest increases in job security and wages relative to their peers in plant that were not acquired.

APPENDIX A

Tables A1–A3.

TABLE A1. Probit Regressions of Acquisition During 1977–1982 and 1982–1987

	Meat packing	Prepared meat products	Poultry slaughter and processing	Meat packing	Prepared meat products	Poultry slaughter and processing
Variable	1977–1982			1982–1987		
Intercept	3.088**	−4.375**	−5.403**	−1.649**	−2.981**	−3.565**
	(0.764)	(0.416)	(0.327)	(0.280)	(0.258)	(0.298)
LnPROD	1.264	−0.493	2.243**	1.574**	−1.193**	0.257
	(1.350)	(0.786)	(0.589)	(0.542)	(0.504)	(0.176)
LnEMP	−0.258**	0.242**	0.227**	0.228**	0.225**	0.247**
	(0.041)	(0.022)	(0.017)	(0.013)	(0.012)	(0.014)
LnSP_RATIO	−0.177	0.429**	0.728**	−0.162**	0.161**	0.324**
	(0.161)	(0.088)	(0.069)	(0.059)	(0.056)	(0.063)
OT_MEAT	−0.146	0.847**	1.134**	0.918**	0.795**	0.738**
	(0.148)	(0.064)	(0.052)	(0.047)	(0.042)	(0.045)
NOT_FOOD	−0.752**	0.376**	−1.123**	0.833**	−0.190**	−0.587**
	(0.172)	(0.089)	(0.111)	(0.059)	(0.049)	(0.058)
LnPROD*	−0.174*	0.136**	0.148**	−0146**	0.090**	−0.009
LnEMP	(0.078)	(0.046)	(0.031)	(0.027)	(0.023)	(0.025)
LnPROD*	−0.315	0.143	−0.518**	−0.070	0.320**	0.041*
LnSP_RATIO	(0.281)	(0.166)	(0.117)	(0.109)	(0.106)	(0.022)
LnPROD*	0.431+	−1.062**	−872**	−0.641**	−0.543**	−0.327**
OT_MEAT	(0.254)	(0.130)	(0.097)	(0.081)	(0.077)	(0.087)
LnPRO*	1.283**	0.292	−1.293**	−0.312**	−0.437**	−0.563**
NOT_FOOD	(0.305)	(0.205)	(0.202)	(0.104)	(0.100)	(0.110)
OBS	922	664	558	866	1047	612

Note: Standard errors are in parentheses. Dependent variable is ACQ. +, *, ** denote significance at 10%, 5%, and 1% significance levels, respectively.

TABLE A2. Probit Regression Results of Plant Closures

Dependent variable	Meat packing		Prepared meat products		Poultry slaughter and processing	
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	1.288***	2.007***	0.259***	1.600***	1.025***	4.249***
	(0.058)	(0.175)	(0.081)	(0.234)	(0.091)	(0.278)
LnPROD77	0.149	0.473***	−0.141***	0.222**	1.139***	1.013***
	(0.019)	(0.058)	(0.029)	(0.097)	(0.033)	(0.119)
$LnEMP_{77}$	−0.306***	−0.480***	−0.336***	−0.668***	−0.323***	−1.098**
	(0.008)	(0.043)	(0.011)	(0.056)	(0.015)	(0.064)
LnWAG_SHARE	0.216***	0.478***	−0.011	0.687***	0.152***	1.595***
	(0.020)	(0.067)	(0.034)	(0.111)	(0.029)	(0.129)
Pr(AC)	−1.438***	−2.372***	−1.040***	−3.847***	−1.939***	−6.486***
	(0.152)	(0.760)	(0.145)	(0.574)	(0.175)	(0.689)
BUYER_PLANT	0.394***	1.243***	0.432***	0.766***	0.043	0.615***
	(0.039)	(0.146)	(0.047)	(0.164)	(0.041)	(0.141)
AGE72	−0.095***	−0.103***	−0.083***	−0.097***	−0.137***	−0.137***
	(0.020)	(0.021)	(0.029)	(0.029)	(0.038)	(0.039)
MULTI	0.544***	0.427***	0.554***	0.338**	0.400***	0.635***
	(0.038)	(0.134)	(0.041)	(0.140)	(0.049)	(0.182)
OT_MEAT	−0.455***	−1.097***	−0.300***	−0.278***	−0.045	0.072
	(0.040)	(0.157)	(0.045)	(0.031)	(0.049)	(0.147)
NOT_FOOD	0.373***	0.003	0.069	−1.137	0.293***	−1.025***
	(0.039)	(0.793)	(0.052)	(0.207)	(0.058)	(0.199)
LnPROD77*	–	−0.090***	–	−0.092***	–	−0.275***
$LnEMP_{77}$		(0.015)		(0.024)		(0.029)
LnWAG_SHARE*	–	−0.064***	–	−0.183***	–	−0.362***
$LnEMP_{77}$		(0.016)		(0.027)		(0.032)
Pr(AC)*$LnEMP_{77}$	–	0.173	–	0.557***	–	0.707***
		(0.117)		(0.106)		(0.112)
BUYER_PLANT*	–	−0.192***	–	−0.060	–	−0.116***
$LnEMP_{77}$		(0.032)		(0.038)		(0.031)
MULTI*	–	0.022	–	0.033	–	−0.039
$LnEMP_{77}$		(0.031)		(0.033)		(0.039)
OT_MEAT*	–	0.157***	–	−0.277***	–	−0.046
$LnEMP_{77}$		(0.034)		(0.031)		(0.032)
NOT_FOOD*	–	0.150	–	0.356***	–	0.304***
$LnEMP_{77}$		(0.130)		(0.047)		(0.046)
Log likelihood	−12854	−12779	−6889	−6798	−3865	−3768
OBS	3066	3066	1803	1803	1276	1276

Note: Plants acquired during 1977–1982. Standard errors are in parentheses. Dependent variable is plant closure (PC = 1,0). *, **, *** denote significance at 10%, 5%, and 1% significance levels, respectively.

TABLE A3. Probit Regression Results of Plant Closures

Dependent variables	Meat packing		Prepared meat products		Poultry slaughter and processing	
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.614***	−0.160	0.515***	0.593***	1.152***	0.403*
	(0.078)	(0.158)	(0.064)	(0.161)	(0.082)	(0.228)
LnPROD82	0.106***	−0.089**	−0.039**	−0.012	0.185***	0.053
	(0.019)	(0.038)	(0.019)	(0.046)	(0.032)	(0.098)
$LnEMP_{82}$	−0.168***	0.122**	−0.326**	−0.371***	−0.286***	0.019
	(0.009)	(0.049)	(0.013)	(0.042)	(0.017)	(0.073)
LnWAGE_SHARE	0.177***	−0.041	0.147***	−0.266***	0.342***	0.042
	(0.024)	(0.054)	(0.023)	(0.069)	(0.030)	(0.096)
Pr(AC)	−0.047	0.424	1.626***	5.847***	−0.131	2.219**
	(0.161)	(0.571)	(0.189)	(0.676)	(0.265)	(1.077)
BUYER_PLANT	0.099**	0.222	0.217***	0.115	0.349***	−0.076
	(0.038)	(0.141)	(0.032)	(0.125)	(0.034)	(0.127)
AGE72	−0.083***	−0.098***	−0.029	−0.017	−0.130***	−0.100**
	(0.027)	(0.027)	(0.029)	(0.030)	(0.039)	(0.043)
AGE77	−0.100***	−0.108***	−0.035	−0.070**	−0.041	−0.054
	(0.031)	(0.032)	(0.035)	(0.035)	(0.771)	(0.048)
MULTI	−0.152***	0.377**	0.126***	0.771***	−0.065	0.547*
	(0.040)	(0.152)	(0.035)	(0.134)	(0.059)	(0.336)
OT_MEAT	−0.445***	0.159	−0.364	−0.756***	−0.119	−1.579***
	(0.056)	(0.173)	(0.047)	(0.179)	(0.075)	(0.202)
NOT_FOOD	1.128***	0.597**	−0.253***	0.058	0.001	1.457***
	(0.053)	(0.295)	(0.039)	(0.152)	(0.049)	(0.206)
LnPROD82*	–	0.072**	–	−0.017	–	0.053**
$LnEMP_{82}$		(0.013)	–	(0.013)	–	(0.024)
LnWAGE_SHARE*	–	0.082***	–	−0.041**	–	0.104***
$LnEMP_{82}$		(0.016)	–	(0.017)	–	(0.027)
Pr(AC)*	–	−0.206**	–	−0.677***	–	−1.014***
EMP_{82}	–	(0.088)	–	(0.116)	–	(0.135)
BUYKEEP*	–	−0.024	–	0.025	–	0.098***
$LnEMP_{82}$	–	(0.029)	–	(0.027)	–	(0.027)
MULTI*	–	−0.107***	–	−0.160***	–	−0.040
$LnEMP_{82}$	–	(0.031)	–	(0.029)	–	(0.055)
OT_MEAT*	–	−0.073**	–	0.028	–	0.456***
$LnEMP_{82}$	–	(0.036)	–	(0.035)	–	(0.047)
NOT_FOOD*	–	−0.198***	–	0.030	–	−0.409***
$LnEMP_{82}$	–	(0.066)	–	(0.034)	–	(0.059)
Log Likelihood	−9239	−9188	−8819	−8718	−4973	−4867
OBS	2090	2090	2108	2108	1169	1169

Note: Plants acquired during 1982–1987. Standard errors are in parentheses. Dependent variable is plant closure (PC = 1,0). *, **, *** denote significance at 10%, 5%, and 1% significance levels.

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